Teaching System Administration

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Why am I doing this?

• Educating people about system administration is important
• Relatively little course and curriculum material is available
• Provide examples and inspiration to potential educators
How did this happen to me?

- I didn't originally have an ambition to be a teacher
- Attended LISA '99 System Administration Education Workshop on a whim
- Started asking computer science department faculty about a system administration class
  - First answer: “But that would be too practical!”
  - Second answer: “That would be great! Will you teach it?”
What had I gotten myself into?

• The LISA education workshop had a wide representation of people and not a lot of common agreement:
  – Educators and non-educators
  – Academic and commercial organizations
  – Education or training?
  – Among educators, very different approaches to teaching

• The hard part is trying to nail down what system administration is all about
So I had to design a class . . .

• My constraints:
  – 8-week summer session, so an *introductory* rather than a comprehensive class
  – Couldn't assume students would have extensive UNIX knowledge
  – Dedicated lab, but limited number of computers
    • No preinstalled OSes
    • 30 students, 10 computers
    • Limited access hours
  – No teaching assistant
My personal notions about teaching

- I always hated unclear, underspecified assignments
- Students should have more than one way to learn
  - Lecture, textbook, personal interaction, independent study
- Principles along with practices
- Include non-technical aspects of system administration (communication, documentation, service to user community)
Class structure

• Students work in groups
  – Emphasizes themes of collaboration and communication (but also cleverly handles limited lab space)

• Grade is primarily based on a series of projects to install and develop a system
  – Later added class discussions for points
  – Mostly objective grading (did it work or not?)
Class website on-line

http://www.cs.uoregon.edu/Classes/12U/cis399sysadmin

• Previous years are also available

http://www.cs.uoregon.edu/Classes/index.php?course=cis399sysadmin
http://www.cs.uoregon.edu/classes/index.php?course=cis410sysadmin
Week 1: Class setup

• Describe class structure and syllabus
• Get students to form groups
• Assign lab systems
• Introductory material on UNIX OS concepts
Week 2: System Installation

● Assignment:
  – Install OS on lab computer and create installation document
  – Each group member must do at least one install and use version control on document

● Goals:
  – Learn about creating a documented, reproducible process
  – Introduction to version control software and concepts
Week 3: Security and Network Configuration

• Assignment:
  – Describe how processes were started on running system
  – Turn off network services (except sshd)
  – Join network
  – Install OS patches

• Goals:
  – Ensure computers are safe on network
  – Introduction to basic security concepts
  – Learn about boot-time process creation
Week 4: Network Services

• Assignment:
  – Build and install Apache httpd, Sendmail from source
  – Demonstrate ability to serve web pages, send and receive mail

• Goals:
  – Learn about software installation and configuration issues
  – Understand HTTP and SMTP as network services
Week 5: Account management

● Assignment:
  - Create accounts on lab machines for all class members and me
  - Write simple use policy for system

● Goals:
  - Understand basics of account management and user support
  - Learn about policy issues
Week 6: Logging and monitoring

• Assignment:
  – Collect examples of specified events from system logs
  – Implement basic access control
  – Write script and cron job to extract and mail log data

• Goals:
  – Understand logging and access control
  – Introduction to scripting and cron scheduling
Week 7-8: Final Project

• Assignment:
  – Students propose and implement system administration project of their choice
  – Must consider concrete goals, user benefits, security, implementation and maintenance effort, documentation

• Goals:
  – Let students research a topic of their choice
  – Introduction to basic self-directed project management
Dangerous choices that worked

- Working in groups
  - Fewer group issues than I anticipated
  - Stole a good idea (from Evi Nemeth) about group work evaluation: students each provide private estimates about member contributions
- Gave students their choice of operating system (of a freely-available UNIX or Linux distribution)
- System emergency day!
Question time!